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10/540,773	12/02/2005	Oscar Divorra Escoda	208536-1	6710

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EXAMINER	
ROBERTS, JESSICA M	
ART UNIT	**PAPER NUMBER**
2482	

NOTIFICATION DATE	DELIVERY MODE
10/29/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)
	10/540,773	DIVORRA ESCODA ET AL.
	Examiner	**Art Unit**
	JESSICA ROBERTS	2482

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 16 August 2010.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1 and 3-11 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1, 3-8 and 11 is/are rejected.

7)☒ Claim(s) 9 and 10 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date ____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Status of the Claims

Claims 1, 3-10 are currently pending in Application 10/540,773. Claim 2 has been cancelled by Applicants amendment filed 01/19/2010.

Acknowledgement of Amendments

Applicant's amendment filed on 08/16/2010 overcomes the following objection(s)/rejection(s):

The objection to claim 3 has been withdrawn because of informalities.

Response to Arguments

Applicant's arguments with respect to claims 1, 3-10 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

1. Claims 9-10 are objected to because of the following informalities:

2. Claim 9 is an improper dependent claim and does not depend from a preceding claim.

3. A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

Re claim 10, which fails to remedy the issue as stated above for claim 9, thus claim 10 is also objected to as being an improper dependent claim.

4. Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 3-8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neff et al., *Very Low Bit Rate Video Coding Based on Matching Pursuits* in view of Frossard et al., *A Posteriori Quantized Matching Pursuit.*

As to **claim 1**, Neff teaches video coding method of exploiting temporal redundancy between successive frames in a video sequence, comprising the steps wherein a reference frame, called an I frame (III-Intraframe Coding), is first approximated by a collection of basis <u>functions</u>, called atoms (fig. 2a element find

atoms), and wherein either the atoms (fig. 2a, element find atoms) are quantized, entropy coded (fig. 2a, element code atoms) and sent to a decoder (fig. 2a, output of code atoms to fig 2b, decode bitstream) or the original frame is encoded (fig. 2) and transmitted to the decoder using any frame codec (fig. 2b) and wherein following predicted frames, called P-frames (see fig. 1, and , are approximated by the geometric transformations of the atoms describing the previous frame (Neff teaches where after the motion prediction image is formed, it is subtracted from the original image to produce the motion residual. This residual is coded using the matching pursuit technique introduced in section II; see III-B Matching Residual Coding. Therefore, it is clear to the Examiner that Neff discloses to predict frames using a matching pursuit algorithm which is composed of atoms, which reads upon the claimed limitation) and that the parameters of the geometric transformation (the matching pursuit algorithm is the used to decompose the motion residual signal into coded dictionary functions which are called functions, see III Detailed System Description) are, entropy coded (fig. 1a element code atoms) and sent to a decoder (fig. 1a output of element code atoms which is input to decode bitstream) in order to reconstruct the predicted frames (fig. 1b output of element current recon.)

Neff does not explicitly teach the specifics of a reference frame called an I frame, and either the atoms are quantized, and predicted frames, called P-frames, wherein the geometric transformations include translations, anisotropic dilations, and rotations.

However, Neff discloses simplified block diagrams of the encoder and decoder are shown in fig. 1. As can be seen in Fig. 1 (a), original images are first motion

compensated using the previous reconstructed image. Here we use the advanced motion model from H.263, as described in Section III-A. The matching pursuit algorithm is then used to decompose the motion residual signal into coded dictionary functions which are called atoms, see III. Detailed System Description and III-A, Motion Compensation. The examiner notes that H.263 includes coding both referenced and predicted frames (I, P, and B), therefore, since the matching pursuit system is implemented using an H.263 encoder and decoder, it is clear that the matching pursuit system as disclosed is capable of performing on reference (I or intra) and predicted (P or inter) frames.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that the H.263 standard encoding and decoding of reference and predicted frames.

Neff is silent in regards the atoms are quantized, and <u>wherein the geometric transformations include translations, anisotropic dilations, and rotations.</u>

However, Frossard teaches the atoms are quantized (Moreover, if the dictionary is very large to ensure a good convergence or even if it contains real parameters, the atoms should be quantized before transmission see pg. 14 IV. Signal Reconstruction Error and pg 23 VI. Quantization of Structured Atoms Indexes), <u>wherein the geometric transformations include translations, anisotropic dilations, and rotations</u> (see II. Matching Pursuit and Structured Dictionaries, B. Group theoretical design of dictionaries, C. Semi-Structured Dictionaries).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Frossard with Neff for providing improved image processing.

As to **claim 3**, Neff (modified by Frossard and well known prior art) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches video coding method according to claim 1, wherein the collection of atoms is a decomposition of the I- frame obtained using a Matching Pursuit (Here we use the advanced motion model from H.263, as described in Section III-A. The matching pursuit algorithm is then used to decompose the motion residual signal into coded dictionary functions which are called atoms, see III. Detailed System Description and III-B. III-D. The examiner notes that H.263 includes coding both referenced and predicted frames, therefore, since the matching pursuit system is implemented using an H.263 encoder and decoder, it is clear that the matching pursuit system as disclosed is more than capable of performing on reference (I or intra) and predicted (P or inter) frames).

As to **claim** 4, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches the video coding method according to claim 1, wherein the parameters and coefficients of the atoms are entropy coded ((Neff teaches when the atom decomposition of a single residual frame is found, it is important to code the resulting parameters efficiently, see Coding Atom Parameters pg. 369 and fig. 2a element code atoms).

Neff is silent in regards to the parameters and coefficients of the atoms are quantized.

However, Frossard teaches the atoms are quantized (Moreover, if the dictionary is very large to ensure a good convergence or even if it contains real parameters, the atoms should be quantized before transmission see pg. 14 IV. Signal Reconstruction Error and pg 23 VI. Quantization of Structured Atoms Indexes).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Frossard with Neff for providing improved image quality.

As to **claim 5,** Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 4. In addition, Neff teaches video coding method according to claim 4, wherein the quantization of the parameters and the coefficients vary across time and the variation is controlled by a rate control unit (see. III-C Buffer Regulation).

As to **claim 6,** Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches video coding method according to claim 1, wherein the method is used together with a residual frame based texture codec that encodes the differences between the original frames and the ones reconstructed using the compensated atoms (see III-B. Matching-Pursuit Residual Coding).

As to **claim 7,** Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches the video coding method according to claim 1, wherein the geometric features (atoms) of the I-frame are computed from the quantized frames at the encoder and decoder and are not transmitted.

However, Frossard teaches wherein the atoms of the I-frame are computed from the quantized frames at the encoder and decoder and are not transmitted (See V. Quantization of Matching Pursuits Coefficients, the examiner notes that matching pursuit is an adaptive algorithm that literately computes quantization coefficients (atoms), where in the subsequent iterations, atoms are computed from previously calculated quantized coefficients (which are components of the quantized frames). In addition, Frossard discloses that dictionaries built on elementary function are thus preferred, since the encoder transmits only the parameters or index of these functions instead of the complete functions, see II. Matching Pursuit and Structured Dictionaries, pg. 6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Frossard with Neff for providing an improved uniformed quantization scheme that adapts to the coefficient decay to provide the best possible approximations with the lowest coding rate.

As to **claim 8**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches the video coding method

according to claim 1, wherein the geometric features (atoms) are re-computed after each quantized frame at the encoder and decoder and replace the previous prediction.

However, Frossard teaches wherein the atoms of the I-frame are computed from the quantized frames at the encoder and decoder and are not transmitted (See V. Quantization of Matching Pursuits Coefficients, the examiner notes that matching pursuit is an adaptive algorithm that literately computes quantization coefficients (atoms), where in the subsequent iterations, atoms are computed from previously calculated quantized coefficients (which are components of the quantized frames).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Frossard with Neff for providing an improved uniformed quantization scheme that adapts to the coefficient decay to provide the best possible approximations with the lowest coding rate.

Regarding **claim 11**, Neff (modified by Frossard) as a whole teaches everything as claimed above, see claim 1. In addition, Neff teaches, video encoding method according to claim 1, wherein the I-frame is approximated by a linear combination of N atoms g.sub..gamma.n(x, y): I .function. (x , y) = n = 0 N - 1 .times. c n .times. g .gamma. .times. .times. n .function. (x , y) ,selected in a redundant, structured library and indexed by a string of parameters .gamma..sub.n representing the geometric transformations applied to the generating mother function g(x,y) where the c.sub.n are weighting coefficients (see II. Matching Pursuit Theory, and equation 4 and Finding Atoms).

Allowable Subject Matter

1. Claims 9-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

2. The following is a statement of reasons for the indication of allowable subject matter: The present invention as claimed involves a video coding method according to claim 11, wherein geometric transformations are used to build the library, the geometric transformations are composed of translations, anisotropic dilations and rotations, applied to a generating mother function g(x,y) by means of the following change of variables:

$$g_\gamma(x,y) = \frac{1}{\sqrt{a_1 a_2}} g(x_a, y_a), \text{ where}$$

$$x_a = \frac{\cos\vartheta(x-b_1) - \sin\vartheta(y-b_2)}{a_1}$$

$$y_a = \frac{\sin\vartheta(x-b_1) + \cos\vartheta(y-b_2)}{a_2}$$

, and wherein the generating mother function is of the following form:

$$g(x,y) = (1-x^2)\exp\left(-\frac{x^2+y^2}{2}\right).$$

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA ROBERTS whose telephone number is (571)270-1821. The examiner can normally be reached on 7:30-5:00 EST Monday-Friday, Alt Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on (571) 272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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